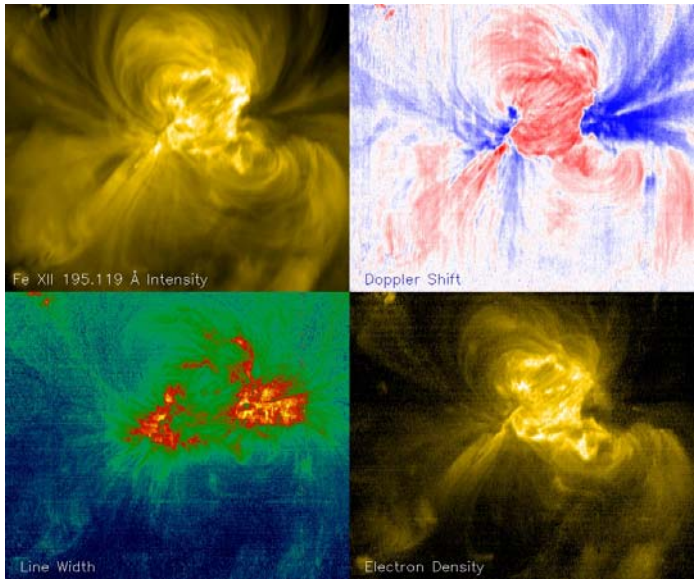
Fine-scale Advanced Coronal Transition-region Spectrograph (FACTS)

FACTS will make measurements of the upper solar atmosphere with factor of ~10 better spatial resolution and larger aperture than prior UV instruments.



EIS/*Hinode* measures intensity, Doppler shift, line width and density.

Science Objectives: determine and characterize the dominant physical processes responsible for the structure, dynamics and evolution of the upper solar atmosphere. These processes drive the global flow of mass/energy in the outer solar atmosphere and space weather events.

Observations: FACTS makes rapid, naturally co-aligned spectroscopic measurements from the photosphere to the corona with 0.1" UV spatial resolution. This combination of temperature coverage and matching spatial resolution has never been achieved before.

Most relevant RFAs:

F1: Understand magnetic reconnection … flares, CMEs, …;
F2: Understand processes … that accelerate … particles;
H1: Understand causes…solar activity ... that affects earth;
J2: Develop prediction capability of … solar activity…;

Mission Implementation Description:

*Mission: single spacecraft mission, 3 axis stabilized, 24 hour solar viewing for most of the year.
*FACTS instrument: 0.1" resolution, four channel EUV/Vis (nominal 170-210Å, 500-2000Å, 2000-8000Å) spectrograph, UV/Vis filter imager.
*EUV spectral imager: 0.1", four channels.
*estimated payload resources required: ~200-250kg, 120W,1-5Mbps daily average TM rate, payload TRL 7.

Measurement Strategy:

*rapid, high spatial resolution, spectra observations.
*simultaneous, coaligned EUV to Vis spectra.
*context provided by: coarser resolution rasters, UV/Vis filtergraph, high resolution EUV spectral imager.

Enabling/Enhancing Technology Development:

- Light weight mirror technologies and LOS stabilization systems for half meter class optics.
- Efficiency and space/solar-flux durability improvements of EUV optical coatings.
- High speed, small pixel, low noise, EUV and visible sensitive rad hard detectors (especially active pixel sensors and solar blind EUV detectors).
- High quality, EUV ellipsoidal variable line spaced gratings.
- Improvements (cost and performance) of spacecraft ACS and TM (e.g. transmitters, receivers, ground stations, reaction wheels, star trackers, sun sensors).